Kansas Agricultural Experiment Station Research Reports

Volume 0
Issue 10 *Swine Day (1968-2014)*

Article 864

2001

Effect of source and irradiation of spray-dried animal plasma on nursery pig performance in a commercial facility

Joel M. DeRouchey

Michael D. Tokach

Jim L. Nelssen

See next page for additional authors

Effect of source and irradiation of spray-dried animal plasma on nursery pig performance in a commercial facility

Abstract

Weanling pigs (1,008; initially 13.5 lb and 18 Â± 2 d of age) were used in a 13-d growth assay to determine the effects of irradiation of two different plasma sources on growth performance. From d 0 to 5 postweaning, pigs fed DuCoaÂ® plasma had improved ADG and F/G compared to pigs fed AP 920 (American Proteins, Inc.). However, from d 5 to 13, pigs fed AP 920 had improved ADG and F/G compared to pigs fed DuCoa plasma. Overall, no differences in ADG, ADFI, or F/G were detected. In addition, no differences in ADG, ADFI, or F/G were detected between irradiated plasma compared its regular form. For the entire experiment, all pigs performed similarly, regardless of plasma source and whether the plasma was irradiated or not.; Swine Day, Manhattan, KS, November 15, 2001

Keywords

Swine day, 2001; Kansas Agricultural Experiment Station contribution; no. 02-132-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 880; Swine; Nursery pig; Animal plasma; Irradiation

Authors

Joel M. DeRouchey, Michael D. Tokach, Jim L. Nelssen, Robert D. Goodband, and Steven S. Dritz

EFFECT OF SOURCE AND IRRADIATION OF SPRAY-DRIED ANIMAL PLASMA ON NURSERY PIG PERFORMANCE IN A COMMERCIAL FACILITY [1]

J. M. DeRouchey, M. D. Tokach, S. S. Dritz [2], J. L. Nelssen, and R. D. Goodband

Summary

Weanling pigs (1,008; initially 13.5 lb and 18 ± 2 d of age) were used in a 13-d growth assay to determine the effects of irradiation of two different plasma sources on growth performance. From d 0 to 5 postweaning, pigs fed DuCoa® plasma had improved ADG and F/G compared to pigs fed AP 920 (American Proteins, Inc.). However, from d 5 to 13, pigs fed AP 920 had improved ADG and F/G compared to pigs fed DuCoa plasma. Overall, no differences in ADG, ADFI, or F/G were detected. In addition, no differences in ADG, ADFI, or F/G were detected between irradiated plasma compared its regular form. For the entire experiment, all pigs performed similarly, regardless of plasma source and whether the plasma was irradiated or not.

(Key Words: Nursery Pig, Animal Plasma, Irradiation.)

Introduction

Previous research at Kansas State University has demonstrated that irradiating spray-dried animal plasma improves pig performance during the first two weeks after weaning with the greatest response observed during the initial week postweaning. The benefit in ADG is usually due to an increase in feed intake. In addition, this improvement due to irradiation has been shown in animal plasma from different ingredient suppliers. However, the majority of the research with irradiated plasma has been conducted in university research facilities. Therefore, it was our objective to determine the effects of irradiation of animal plasma from two different ingredient suppliers on nursery pig performance in a commercial nursery facility.

Procedures

A total of 1,008 pigs (initially 13.5 lbs and 18 ± 2 d of age) was used in a 13-d growth assay. Pigs were randomly sorted into one of 48 pens (24 pens of barrows and 24 pens of gilts) with 21 pigs/pen. All pens were then weighed and pigs allotted so all pens within each block (six total) were initially the same weight. One pen of barrows and one pen of gilts consumed feed from a single fenceline feeder. Thus the experimental unit is the combined data from the two pens. Pigs were housed in a commercial nursery located in southern Minnesota.

Pigs were allotted to one of four dietary treatments that included diets containing animal plasma from American Proteins, Inc (AP 920) or DuCoa, either in its regular or irradiated form. Single lots of the plasma sources were divided equally into two portions, with one of the portions receiving an average irradiation dose of 8.0 kGy via electrical pasteurization. All pigs were budgeted 1 lb of SEW diet (6.7% plasma), and then fed a transition diet (2.5% plasma) for the remainder of the 13-d experiment. Pigs

[1]Appreciation is expressed to Damon Knobloch and Marlin Krukeberg of Holden Farms, Northfield, MN, for use of pigs and data collection; and Ernie Hanson of Hubbard Milling, Mankato, MN, for feed manufacturing.

[2]Food Animal Health and Management Center.

were fed experimental diets containing plasma from the same treatment for the entire study. Pigs were weighed and feed disappearance measured on d 5 and 13 after weaning to determine ADG, ADFI, and F/G for the experimental period.

Data was analyzed using the GLM procedures of SAS as a randomized complete block design with pens (one barrow and one gilt) consuming feed from a single feeder as the experimental unit. Least square means were used to determine differences between treatments. Also, contrasts were used to determine plasma source and irradiation effects.

Results and Discussion

From d 0 to 5 postweaning, pigs fed DuCoa plasma had improved ($P<0.05$) ADG and F/G compared to pigs fed AP 920 with no differences in ADFI. Irradiation of plasma, regardless of source, did not influence growth performance. From d 5 to 13, pigs fed AP 920 had improved ($P<0.05$) ADG and F/G compared to pigs fed DuCoa plasma. Similar to d 0 to 5, ADFI was not influenced by plasma source and irradiation of plasma had no effect on growth performance.

Overall, no differences in ADG, ADFI, or F/G were detected between treatments as all pigs performed similarly, regardless of plasma source and whether the plasma was irradiated or not.

In conclusion, the results of this study conflict with previously reported data that indicated irradiation of animal plasma improved growth performance in nursery pigs. The improved ADG generally observed from pigs fed irradiated plasma in previous trials has been the result of increased ADFI, which did not occur in this experiment. Although differences between plasma sources were detected within the two periods, pigs performed similarly overall. Thus, least cost pricing of plasma should be used to maximize profitability without jeopardizing growth performance, and research studying the effects of nursery pigs fed irradiated plasma under commercial conditions needs further investigation.

Table 1. Composition of Experimental Diets

Ingredient, %	SEW[a]	Transition[b]
Corn	33.65	36.63
Spray-dried whey	25.00	25.00
Soybean meal (46.5% CP)	12.53	21.37
Spray-dried animal plasma[c]	6.70	2.50
Select menhaden fish meal	6.00	6.00
Choice white grease	6.00	5.00
Lactose	5.00	-
Spray-dried blood cells	1.65	-
Medication[d]	1.00	1.00
Monocalcium phosphate (21% P)	0.75	0.75
Limestone	0.45	0.50
Zinc oxide	0.38	0.38
Vitamin/trace mineral premix	0.30	0.30
Salt	0.20	0.30
L-lysine HCl	0.15	0.15
DL-methionine	0.15	0.07
L-threonine	0.05	0.05
Choline chloride, 60%	0.05	-
Total	100.00	100.00
Calculated Analysis		
Lysine, %	1.70	1.55
Met:lysine ratio, %	30	29
Met & Cys:lysine ratio,%	56	54
Threonine:lysine ratio, %	64	65
Tryptophan:lysine ratio, %	18	18
ME, kcal/lb	1,524	1574
Crude protein, %	22.3	21.9
Calcium, %	0.97	0.92
Phosphorus, %	0.82	0.81
Available phosphorus, %	0.65	0.59
Lysine:calorie ratio, g/Mcal ME	5.06	4.47

[a]Fed for first 5 d post-weaning. [b]Fed from d 5 until d 13 post-weaning. [c]AP 920 (American Proteins, Inc., Ames, IA.) or DuCoa (Highland, IL), regular or irradiated. [d]Provided 140 g neoymicin and 140 g oxytetracycline per ton.

Table 2. Effects of Source and Irradiation of Animal Plasma on Weanling Pig Growth Performance[a]

	AP 920[b]		DuCoa[c]		
Item	Regular	Irradiated	Regular	Irradiated	SEM
d 0 to 5					
ADG, lb[d]	0.24	0.23	0.27	0.27	0.02
ADFI, lb	0.24	0.24	0.26	0.24	0.01
F/G[d]	1.07	1.09	1.02	0.95	0.04
d 5 to 13					
ADG, lb[d]	0.58	0.58	0.56	0.56	0.01
ADFI, lb	0.57	0.60	0.60	0.59	0.01
F/G[d]	0.99	1.02	1.08	1.05	0.02
d 0 to 13					
ADG, lb	0.45	0.45	0.44	0.45	0.01
ADFI, lb	0.45	0.46	0.47	0.46	0.01
F/G	0.99	1.03	1.05	1.02	0.02

[a]A total of 1,008 pigs (6 feeders/trt with 2 pens of 21 pigs per feeder, thus 42 pigs consumed feed per feeder) with an average initial BW of 13.5 lb. [b]American Proteins, Inc., Ames, IA. [c]DuCoa L. P., Highland, IL. [d]AP 920 vs. DuCoa ($P<0.05$).